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PART NO. : MG1903A-SERIES

FOR MESSRS. : \_\_\_\_\_

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|            |                            |             |
|            |                            |             |



ACCEPTED BY : \_\_\_\_\_ PROPOSED BY : \_\_\_\_\_

## RECORD OF REVISION

| DATE | PAGE | SUMMARY |
|------|------|---------|
|      |      |         |

### 3. General specifications

#### 3.1 General specifications

PLEASE REFER TO :

- a. "CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)"
- b. "CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (IC-ST7920)"

#### 3.2 This individual specification is prior to general specifications

#### 3.3 NUMBERING SYSTEM

**MG1903A**

|   |
|---|
| W |
|---|

 - 

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| S | Y | M | L | W | U | N |
|---|---|---|---|---|---|---|

(1)                      (2)    (3)    (4)    (5)    (6)    (7)    (8)

(1).LCM TEMPERATURE :

“nil” : NORMAL TEMP

“W” : WIDE TEMP

(2).LCD TYPE :

“S” : STN TYPE

“F” : FSTN TYPE

(3).LCD COLOR :

“Y” : YELLOW-GREEN    “B” : BLUE(STN/NEGATIVE)/BLACK(FSTN/NEGATIVE)

“G” : GRAY                      “W” : WHITE(FSTN/POSITIVE)

(4).LCD POLARIZE TYPE :

“nil” : TRANSFLECTIVE

“M” : TRANSMISSIVE

(5).BACKLIGHT TYPE :

“R” : REFLECTIVE

“L” : LED BACKLIGHT

(6).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN    “A” : AMBER

“O” : ORANGE                      “R” : RED

(7). VIEWING DIRECTION :

“nil” : 6 O’CLOCK

“3” : 3 O’CLOCK

“U” : 12 O’CLOCK

“9” : 9 O’CLOCK

(8).BACKLIGHT TYPE :

“nil” : A(+),K(-)---NORMAL

“N” : A(+),K(-)---CHANGE

#### 4. Mechanical data

- (1) NUMBER OF DOT -----192 W \* 32 H DOTS
- (2) MODULE SIZE -----116.0 W \* 37.0 H \* “C” T (Max) mm
- (3) EFFECTIVE AREA -----84.0 W \* 19.0 H mm
- (4) ACTIVE AREA -----80.61 W \* 15.97 H mm
- (5) DOT SIZE-----0.39 W \* 0.47 H mm
- (6) DOT PITCH -----0.42 W \* 0.50 H mm

*NOTE : The dimension of "C", please refer to Outline dimension on PAGE 8/10*

## 5. Absolute maximum ratings

### 5.1 Electrical absolute maximum ratings

| <i>I T E M</i>         | <i>SYMBOL</i>                    | <i>MIN.</i> | <i>MAX.</i>          | <i>UNIT</i> | <i>COMMENT</i> |
|------------------------|----------------------------------|-------------|----------------------|-------------|----------------|
| POWER SUPPLY FOR LOGIC | V <sub>DD</sub> -V <sub>SS</sub> | -0.3        | 5.5                  | V           | -----          |
| POWER SUPPLY FOR LCD   | V <sub>O</sub>                   | -0.3        | 3.5                  | V           | -----          |
| INPUT VOLTAGE          | V <sub>I</sub>                   | -0.3        | V <sub>DD</sub> +0.3 | V           | -----          |
| STATIC ELECTRICITY     | -----                            | -----       | 100                  | V           | NOTE(1)        |
| POWER SUPPLY FOR LED   | V <sub>LED</sub>                 | -----       | 6.0                  | V           | -----          |

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING  
A 200pF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A  
INTERFACE CONNECTOR PIN.

### 5.2 Environmental absolute maximum ratings

| I T E M                | CONDITION | OPERATING         |      | STORAGE           |      | COMMENT                                     |
|------------------------|-----------|-------------------|------|-------------------|------|---------------------------------------------|
|                        |           | MIN.              | MAX. | MIN.              | MAX. |                                             |
| AMBIENT<br>TEMPERATURE | NORMAL    | 0°C               | 50°C | -20°C             | 70°C | -----                                       |
|                        | WIDE      | -20°C             | 70°C |                   |      |                                             |
| HUMIDITY               | -----     | NOTE (3)          |      | NOTE (3)          |      | NO<br>CONDENSATION                          |
| VIBRATION<br>NOTE (4)  | -----     | -----             | 0.5G | -----             | 2G   | 10~300Hz<br>XYZ<br>DIRECTIONS<br>1 Hr EACH  |
| SHOCK<br>NOTE (4)      | -----     | -----             | 3G   | -----             | 50G  | 10 msec<br>XYZ<br>DIRECTIONS<br>1 TIME EACH |
| CORROSIVE<br>GAS       | -----     | NOT<br>ACCEPTABLE |      | NOT<br>ACCEPTABLE |      | -----                                       |

NOTE (3):Ta ≤ 50°C: 90% RH MAX.

Ta > 50°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE  
HUMIDITY OF 90% RH AT 50°C. (80% RH AT 60°C)

NOTE (4):1G = 9.8 m/s<sup>2</sup>

## 6. Electrical characteristics

Ta = 25°C

| <i>I T E M</i>                           | <i>SYMBOL</i>                     | <i>CONDITION</i>                               |          | <i>MIN.</i>         | <i>TYP.</i> | <i>MAX.</i>     | <i>UNIT</i> |
|------------------------------------------|-----------------------------------|------------------------------------------------|----------|---------------------|-------------|-----------------|-------------|
| POWER SUPPLY VOLTAGE FOR CIRCUIT         | V <sub>DD</sub> - V <sub>SS</sub> | -----                                          |          | 2.7                 | -----       | 5.5             | V           |
| INPUT VOLTAGE                            | V <sub>IH</sub>                   | -----                                          |          | 0.7 V <sub>DD</sub> | -----       | V <sub>DD</sub> | V           |
|                                          | V <sub>IL</sub>                   | -----                                          |          | -0.3                | -----       | 0.6             | V           |
| OUTPUT VOLTAGE                           | V <sub>OH</sub>                   | I <sub>OH</sub> =-0.1 mA                       |          | 0.8V <sub>DD</sub>  | -----       | V <sub>DD</sub> | V           |
|                                          | V <sub>OL</sub>                   | I <sub>OL</sub> = 0.1 mA                       |          | -----               | -----       | 0.1             | V           |
| POWER SUPPLY CURRENT                     | I <sub>DD</sub>                   | V <sub>DD</sub> - V <sub>SS</sub>              |          | -----               | 0.5         | 1.0             | mA          |
| RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1) | V <sub>O</sub> -V <sub>SS</sub>   | STN/<br>FSTN<br>DUTY =1/32<br>Φ=10°<br>NOTE(2) | Ta=-20°C | -----               | -----       | 3.5             | V           |
|                                          |                                   |                                                | Ta= 0°C  | -----               | -----       | 3.5             | V           |
|                                          |                                   |                                                | Ta= 25°C | -----               | 3.0         | 3.5             | V           |
|                                          |                                   |                                                | Ta= 50°C | -----               | -----       | 3.5             | V           |
|                                          |                                   |                                                | Ta= 70°C | -----               | -----       | 3.5             | V           |
| POWER SUPPLY CURRENT FOR NOTE(3)         | I <sub>LED</sub>                  | V <sub>LED</sub> =NOTE(3)                      |          | -----               | NOTE(3)     | NOTE(3)         | mA          |

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(2): θ = 0° : VIEWING DIRECTION AT 6 O'CLOCK  
θ = 180° : VIEWING DIRECTION AT 12 O'CLOCK

(3): LED CURRENT OF DIFFIRENT LED TYPE

| <i>LED B.L TYPE</i> | <i>V<sub>LED</sub></i> | <i>I<sub>LED</sub></i> |             |             |              | <i>LED COLOR</i>              |
|---------------------|------------------------|------------------------|-------------|-------------|--------------|-------------------------------|
|                     |                        | <i>MIN.</i>            | <i>TYP.</i> | <i>MAX.</i> | <i>UNIT.</i> |                               |
| A                   | 5.0V                   | -----                  | 125         | 250         | mA           | YELLOW-GREEN、AMBER、ORANGE、RED |

## 7. Optical characteristics

### STN TYPE LCD

Ta = 25°C

| I T E M        | SYMBOL          | CONDITION                    | MIN. | TYP. | MAX. | UNIT | NOTE    |
|----------------|-----------------|------------------------------|------|------|------|------|---------|
| VIEWING ANGLE  | $\Phi 2-\Phi 1$ | K = 2.0<br>NOTE(1)           | 30   | 40   | ---- | deg. | NOTE(2) |
| CONTRAST RATIO | K               | $\Phi = 10^\circ$<br>NOTE(1) | 3.0  | 4.0  | ---- | ---- | NOTE(2) |
| RESPONSE TIME  | tr (rise)       | $\Phi = 10^\circ$<br>NOTE(1) | ---- | 200  | 350  | ms   | NOTE(2) |
|                | tf (fall)       | $\Phi = 10^\circ$<br>NOTE(1) | ---- | 300  | 400  | ms   | NOTE(2) |

### FSTN /STN BLUE TYPE LCD

Ta = 25°C

| I T E M        | SYMBOL          | CONDITION                    | MIN. | TYP. | MAX. | UNIT | NOTE    |
|----------------|-----------------|------------------------------|------|------|------|------|---------|
| VIEWING ANGLE  | $\Phi 2-\Phi 1$ | K = 2.0<br>NOTE(1)           | 30   | 40   | ---- | deg. | NOTE(2) |
| CONTRAST RATIO | K               | $\Phi = 10^\circ$<br>NOTE(1) | 4.0  | 5.0  | ---- | ---- | NOTE(2) |
| RESPONSE TIME  | tr (rise)       | $\Phi = 10^\circ$<br>NOTE(1) | ---- | 200  | 350  | ms   | NOTE(2) |
|                | tf (fall)       | $\Phi = 10^\circ$<br>NOTE(1) | ---- | 300  | 400  | ms   | NOTE(2) |

### Brightness for LCM backlight

| SYMBOL | CONDITION                              | MIN. | TYP. | MAX. | UNIT              | LED TYPE                            | NOTE               |
|--------|----------------------------------------|------|------|------|-------------------|-------------------------------------|--------------------|
| B      | $\Phi = 0^\circ$<br>$\theta = 0^\circ$ | 4.0  | ---- | ---- | cd/m <sup>2</sup> | YELLOW-GREEN, RED,<br>AMBER, ORANGE | NOTE(2)<br>NOTE(3) |

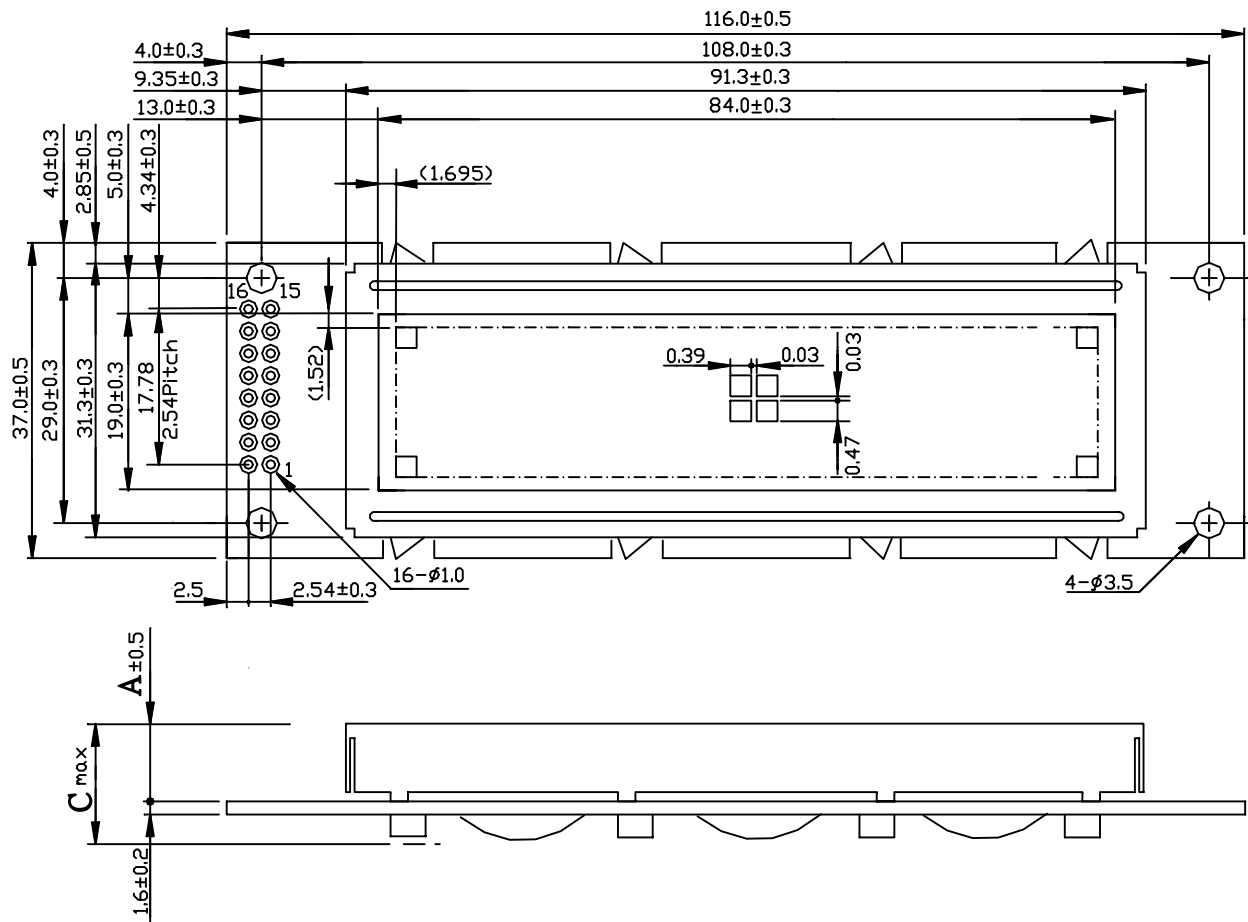
NOTE (1):  $\theta = 0^\circ$  WHEN VIEWING DIRECTION AT 6 O'CLOCK

$\theta = 180^\circ$  WHEN VIEWING DIRECTION AT 12 O'CLOCK

(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

## 8. Outline dimension



| TYPE     | A   | C    |
|----------|-----|------|
| LED B.L. | 9.5 | 15.0 |
| NO B.L.  | 4.9 | 10.0 |

NOTE :

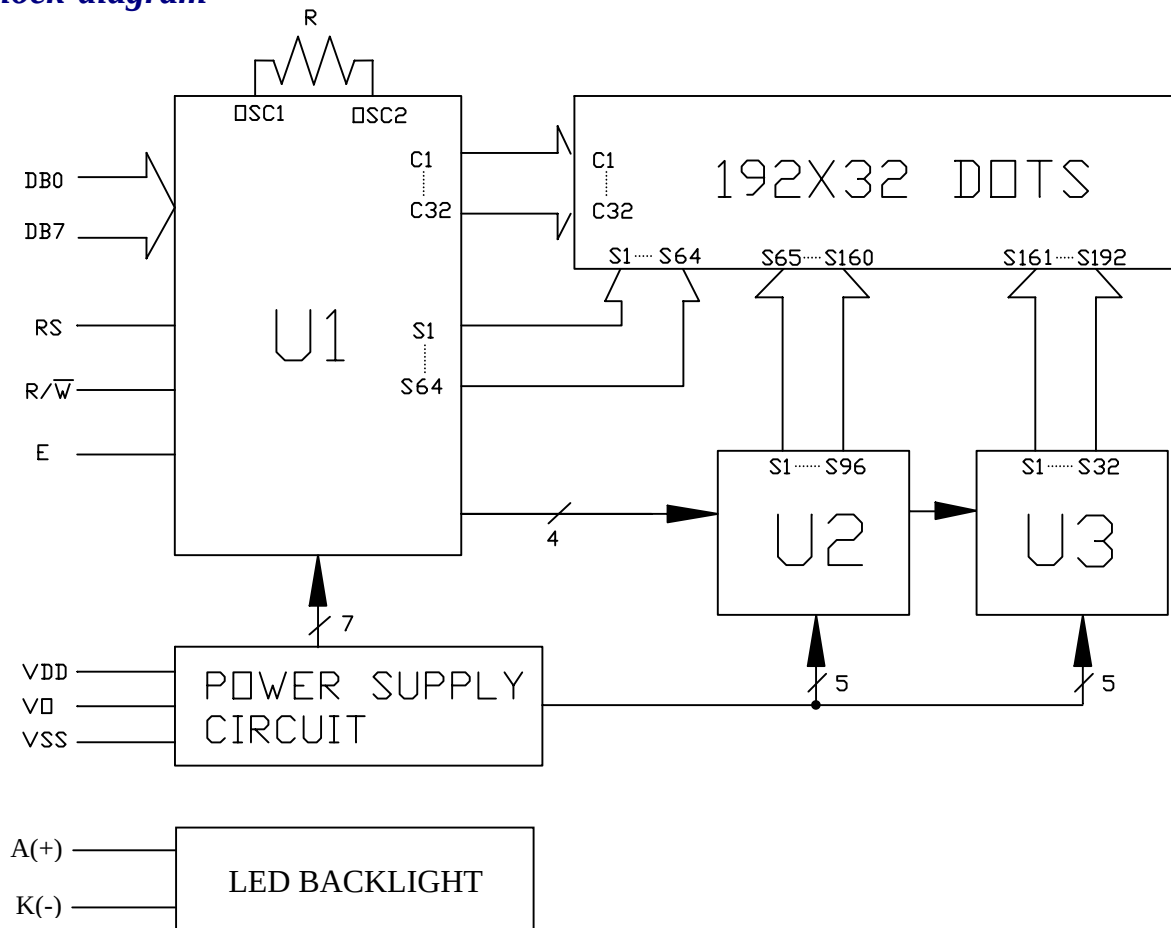
1.UNIT : mm

## 2.SCALE : NTS

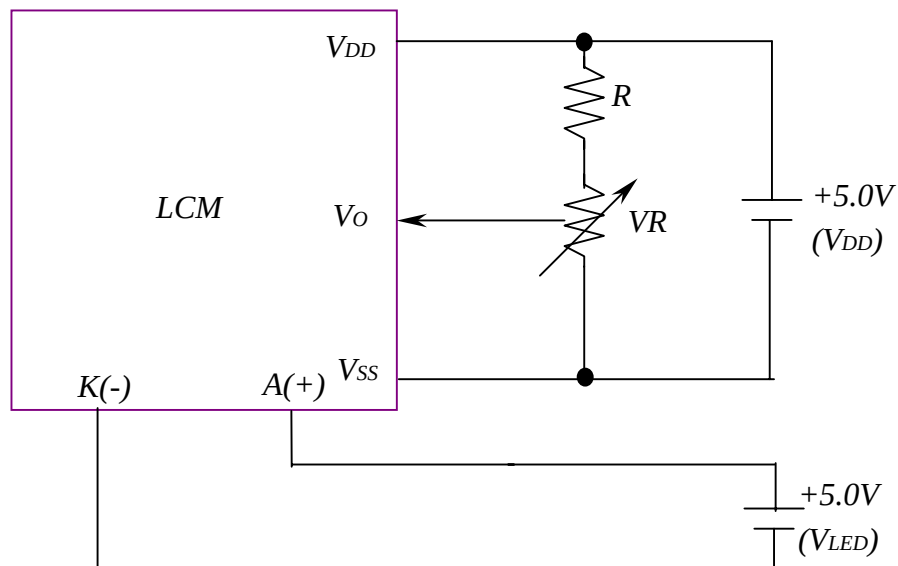
### 8.1 Interface pin connection

| <i><b>PIN NO.</b></i> | <i><b>SYMBOL</b></i> | <i><b>FUNCTION</b></i>                                                  |
|-----------------------|----------------------|-------------------------------------------------------------------------|
| 1                     | V <sub>SS</sub>      | POWER SUPPLY ( GND )                                                    |
| 2                     | V <sub>DD</sub>      | POWER SUPPLY ( +5V )                                                    |
| 3                     | V <sub>o</sub>       | POWER SUPPLY FOR LCD                                                    |
| 4                     | RS                   | RS = "H" DB0~DB7 FOR DISPLAY DATA<br>RS = "L" DB0~DB7 FOR CONTROL DATA  |
| 5                     | R/ $\overline{W}$    | H: DATA READ ( LCD MODULE → MPU )<br>L: DATA WRITE ( LCD MODULE ← MPU ) |
| 6                     | E                    | ENABLE SIGNAL                                                           |
| 7                     | DB0                  | DATA INPUT/OUTPUT (LSB)                                                 |
| 8                     | DB1                  | DATA INPUT/OUTPUT                                                       |
| 9                     | DB2                  | DATA INPUT/OUTPUT                                                       |
| 10                    | DB3                  | DATA INPUT/OUTPUT                                                       |
| 11                    | DB4                  | DATA INPUT/OUTPUT                                                       |
| 12                    | DB5                  | DATA INPUT/OUTPUT                                                       |
| 13                    | DB6                  | DATA INPUT/OUTPUT                                                       |
| 14                    | DB7                  | DATA INPUT/OUTPUT (MSB)                                                 |
| 15                    | A(+)                 | POWER SUPPLY FOR LED (+)                                                |
| 16                    | K(-)                 | POWER SUPPLY FOR LED (-)                                                |

## 9. Block diagram



## 10. Power supply for LCM



$V_0 - V_{ss}$ : LCD DRIVING VOLTAGE

VR: 10KΩ~20KΩ